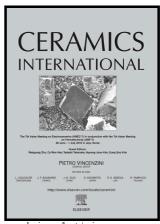
# Author's Accepted Manuscript

Microstructure and mechanical properties of porous Si<sub>3</sub>N<sub>4</sub>/Invar joints brazed with Ag-Cu-Ti+Mo/Cu/Ag-Cu multi-layered composite filler

J.Y. Liu, T.P. Wang, C.F. Liu, J. Zhang



www.elsevier.com/locate/ceri

PII: S0272-8842(17)31191-4

DOI: http://dx.doi.org/10.1016/j.ceramint.2017.05.354

Reference: CERI15514

To appear in: Ceramics International

Received date: 5 April 2017 Revised date: 14 May 2017 Accepted date: 31 May 2017

Cite this article as: J.Y. Liu, T.P. Wang, C.F. Liu and J. Zhang, Microstructure and mechanical properties of porous Si<sub>3</sub>N<sub>4</sub>/Invar joints brazed with Ag-Cu Ti+Mo/Cu/Ag-Cu multi-layered composite filler, *Ceramics International* http://dx.doi.org/10.1016/j.ceramint.2017.05.354

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

## ACCEPTED MANUSCRIPT

Microstructure and mechanical properties of porous Si<sub>3</sub>N<sub>4</sub>/Invar joints brazed with Ag-Cu-Ti+Mo/Cu/Ag-Cu multi-layered

composite filler

J. Y. Liu<sup>1</sup>, T.P. Wang<sup>2</sup>, C.F. Liu<sup>2</sup>, J. Zhang<sup>1\*</sup>

<sup>1</sup>School of Materials Science and Engineering, Harbin Institute of Technology, Harbin 150001, PR China <sup>2</sup>State Grid Liaoning Electric Power Research Institute, Shenyang 110006, PR China

\*Corresponding author:

Tel./fax: +86 451 86414234. hitzhangjie@hit.edu.cn

#### **Abstract**

Ag-Cu-Ti/Cu/Ag-Cu multi-layered filler was successfully designed to braze porous Si<sub>3</sub>N<sub>4</sub> and Invar alloy. To further reduce the CTE mismatch between the porous Si<sub>3</sub>N<sub>4</sub> and brazing filler, Mo particles were introduced into Ag-Cu-Ti. The effects of the Mo addition on the microstructure and mechanical properties of the brazed joints were studied. The results showed that, the addition of Mo particles into Ag-Cu-Ti lowered the CTE mismatch and improved the joint strength to a certain degree. However, an excessive content was harmful. The Mo particles could absorb Ti at high temperature, causing Ti shortage in the reaction with the ceramic. When cooling down, the absorbed Ti was released. The released Ti could react with Cu to generate Cu-Ti phase. So, additional Ti was adopted in the brazing filler as a supplement. When the Ti content was 5wt.%, the reaction layer on the ceramic interface was too thin to transfer enough load. However, when it reached 15wt.%, the Cu interlayer dissolved completely and Fe-Ti and Ni-Ti phases appeared. The maximum joint shear strength (83MPa) was obtained with 10wt.% Ti and 5vol.% Mo, which had exceeded 90% of the porous Si<sub>3</sub>N<sub>4</sub> and was 56% higher than the joint brazed without Mo particles.

### Download English Version:

# https://daneshyari.com/en/article/5437448

Download Persian Version:

https://daneshyari.com/article/5437448

<u>Daneshyari.com</u>